



US Utility 50229-435 Sequence Listing.txt
SEQUENCE LISTING

<110> University of Kentucky Research Foundation
Moscow, Jeffrey A.
Jordan, Craig
Xin, Lu

<120> AN ORGANIC CATION TRANSPORTER PREFERENTIALLY EXPRESSED IN
HEMATOPOIETIC CELLS

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<140> 10/849,551

<141> 2004-05-20

<150> 60/471,709

<151> 2003-05-20

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US Utility 50229-435 Sequence Listing.txt

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US Utility 50229-435 Sequence Listing.txt

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US Utility 50229-435 Sequence Listing.txt

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 <212> PRT
 <213> Homo sapiens
 <400> 4

Met Arg Asp Tyr Asp Glu Val Ile Ala Phe Leu Gly Glu Trp Gly Pro
 1 5 10 15

Phe Gln Arg Leu Ile Phe Phe Leu Leu Ser Ala Ser Ile Ile Pro Asn
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US Utility 50229-435 Sequence Listing.txt

20

25

30

Gly Phe Asn Gly Met Ser Val Val Phe Leu Ala Gly Thr Pro Glu His
35 40 45

Arg Cys Arg Val Pro Asp Ala Ala Asn Leu Ser Ser Ala Trp Arg Asn
50 55 60

Asn Ser Val Pro Leu Arg Leu Arg Asp Gly Arg Glu Val Pro His Ser
65 70 75 80

Cys Ser Arg Tyr Arg Leu Ala Thr Ile Ala Asn Phe Ser Ala Leu Gly
85 90 95

Leu Glu Pro Gly Arg Asp Val Asp Leu Gly Gln Leu Glu Gln Glu Ser
100 105 110

Cys Leu Asp Gly Trp Glu Phe Ser Gln Asp Val Tyr Leu Ser Thr Val
115 120 125

Val Thr Glu Trp Asn Leu Val Cys Glu Asp Asn Trp Lys Val Pro Leu
130 135 140

Thr Thr Ser Leu Phe Phe Val Gly Val Leu Leu Gly Ser Phe Val Ser
145 150 155 160

Gly Gln Leu Ser Asp Arg Phe Gly Arg Lys Asn Val Leu Phe Ala Thr
165 170 175

Met Ala Val Gln Thr Gly Phe Ser Phe Leu Gln Ile Phe Ser Ile Ser
180 185 190

Trp Glu Met Phe Thr Val Leu Phe Val Ile Val Gly Met Gly Gln Ile
195 200 205

Ser Asn Tyr Val Val Ala Phe Ile Leu Gly Thr Glu Ile Leu Gly Lys
210 215 220

Ser Val Arg Ile Ile Phe Ser Thr Leu Gly Val Cys Thr Phe Phe Ala
225 230 235 240

Val Gly Tyr Met Leu Leu Pro Leu Phe Ala Tyr Phe Ile Arg Asp Trp
245 250 255

Arg Met Leu Leu Leu Ala Leu Thr Val Pro Gly Val Leu Cys Val Pro
260 265 270

US Utility 50229-435 Sequence Listing.txt

Leu Trp Trp Phe Ile Pro Glu Ser Pro Arg Trp Leu Ile Ser Gln Arg
275 280 285

Arg Phe Arg Glu Ala Glu Asp Ile Ile Gln Lys Ala Ala Lys Met Asn
290 295 300

Asn Ile Ala Val Pro Ala Val Ile Phe Asp Ser Val Glu Glu Leu Asn
305 310 315 320

Pro Leu Lys Gln Gln Lys Ala Phe Ile Leu Asp Leu Phe Arg Thr Arg
325 330 335

Asn Ile Ala Ile Met Thr Ile Met Ser Leu Leu Leu Trp Met Leu Thr
340 345 350

Ser Val Gly Tyr Phe Ala Leu Ser Leu Asp Ala Pro Asn Leu His Gly
355 360 365

Asp Ala Tyr Leu Asn Cys Phe Leu Ser Ala Leu Ile Glu Ile Pro Ala
370 375 380

Tyr Ile Thr Ala Trp Leu Leu Leu Arg Thr Leu Pro Arg Arg Tyr Ile
385 390 395 400

Ile Ala Ala Val Leu Phe Trp Gly Gly Gly Val Leu Leu Phe Ile Gln
405 410 415

Leu Val Pro Val Asp Tyr Tyr Phe Leu Ser Ile Gly Leu Val Met Leu
420 425 430

Gly Lys Phe Gly Ile Thr Ser Ala Phe Ser Met Leu Tyr Val Phe Thr
435 440 445

Ala Glu Leu Tyr Pro Thr Leu Val Arg Asn Met Ala Val Gly Val Thr
450 455 460

Ser Thr Ala Ser Arg Val Gly Ser Ile Ile Ala Pro Tyr Phe Val Tyr
465 470 475 480

Leu Gly Ala Tyr Asn Arg Met Leu Pro Tyr Ile Val Met Gly Ser Leu
485 490 495

Thr Val Leu Ile Gly Ile Leu Thr Leu Phe Phe Pro Glu Ser Leu Gly
500 505 510

Met Thr Leu Pro Glu Thr Leu Glu Gln Met Gln Lys Val Lys Trp Phe
515 520 525

US Utility 50229-435 Sequence Listing.txt

Arg Ser Gly Lys Lys Thr Arg Asp Ser Met Glu Thr Glu Glu Asn Pro
530 535 540

Lys Val Leu Ile Thr Ala Phe
545 550

<210> 5
<211> 551
<212> PRT
<213> Homo sapiens

<400> 5

Met Ala Gln Phe Val Gln Val Leu Ala Glu Ile Gly Asp Phe Gly Arg
1 5 10 15

Phe Gln Ile Gln Leu Leu Ile Leu Leu Cys Val Leu Asn Phe Leu Ser
20 25 30

Pro Phe Tyr Phe Phe Ala His Val Phe Met Val Leu Asp Glu Pro His
35 40 45

His Cys Ala Val Ala Trp Val Lys Asn His Thr Phe Asn Leu Ser Ala
50 55 60

Ala Glu Gln Leu Val Leu Ser Val Pro Leu Asp Thr Ala Gly His Pro
65 70 75 80

Glu Pro Cys Leu Met Phe Arg Pro Pro Pro Ala Asn Ala Ser Leu Gln
85 90 95

Asp Ile Leu Ser His Arg Phe Asn Glu Thr Gln Pro Cys Asp Met Gly
100 105 110

Trp Glu Tyr Pro Glu Asn Arg Leu Pro Ser Leu Lys Asn Glu Phe Asn
115 120 125

Leu Val Cys Asp Arg Lys His Leu Lys Asp Thr Thr Gln Ser Val Phe
130 135 140

Met Gly Gly Leu Leu Val Gly Thr Leu Met Phe Gly Pro Leu Cys Asp
145 150 155 160

Arg Ile Gly Arg Lys Ala Thr Ile Leu Ala Gln Leu Leu Leu Phe Thr
165 170 175

Leu Ile Gly Leu Ala Thr Ala Phe Val Pro Ser Phe Glu Leu Tyr Met
180 185 190

US utility 50229-435 Sequence Listing.txt

Ala Leu Arg Phe Ala Val Ala Thr Ala Val Ala Gly Leu Ser Phe Ser
195 200 205

Asn Val Thr Leu Leu Thr Glu Trp Val Gly Pro Ser Trp Arg Thr Gln
210 215 220

Ala Val Val Leu Ala Gln Cys Asn Phe Ser Leu Gly Gln Met Val Leu
225 230 235 240

Ala Gly Leu Ala Tyr Gly Phe Arg Asn Trp Arg Leu Leu Gln Ile Thr
245 250 255

Gly Thr Ala Pro Gly Leu Leu Leu Phe Phe Tyr Phe Trp Ala Leu Pro
260 265 270

Glu Ser Ala Arg Trp Leu Leu Thr Arg Gly Arg Met Asp Glu Ala Ile
275 280 285

Gln Leu Ile Gln Lys Ala Ala Ser Val Asn Arg Arg Lys Leu Ser Pro
290 295 300

Glu Leu Met Asn Gln Leu Val Pro Glu Lys Thr Gly Pro Ser Gly Asn
305 310 315 320

Ala Leu Asp Leu Phe Arg His Pro Gln Leu Arg Lys Val Thr Leu Ile
325 330 335

Ile Phe Cys Val Trp Phe Val Asp Ser Leu Gly Tyr Tyr Gly Leu Ser
340 345 350

Leu Gln Val Gly Asp Phe Gly Leu Asp Val Tyr Leu Thr Gln Leu Ile
355 360 365

Phe Gly Ala Val Glu Val Pro Ala Arg Cys Ser Ser Ile Phe Met Met
370 375 380

Gln Arg Phe Gly Arg Lys Trp Ser Gln Leu Gly Thr Leu Val Leu Gly
385 390 395 400

Gly Leu Met Cys Ile Ile Ile Ile Phe Ile Pro Ala Asp Leu Pro Val
405 410 415

Val Val Thr Met Leu Ala Val Val Gly Lys Met Ala Thr Ala Ala Ala
420 425 430

Phe Thr Ile Ser Tyr Val Tyr Ser Ala Glu Leu Phe Pro Thr Ile Leu
435 440 445

US Utility 50229-435 Sequence Listing.txt

Arg Gln Thr Gly Met Gly Leu Val Gly Ile Phe Ser Arg Ile Gly Gly
450 455 460

Ile Leu Thr Pro Leu Val Ile Leu Leu Gly Glu Tyr His Ala Ala Leu
465 470 475 480

Pro Met Leu Ile Tyr Gly Ser Leu Pro Ile Val Ala Gly Leu Leu Cys
485 490 495

Thr Leu Leu Pro Glu Thr His Gly Gln Gly Leu Lys Asp Thr Leu Gln
500 505 510

Asp Leu Glu Leu Gly Pro His Pro Arg Ser Pro Lys Ser Val Pro Ser
515 520 525

Glu Lys Glu Thr Glu Ala Lys Gly Arg Thr Ser Ser Pro Gly Val Ala
530 535 540

Phe Val Ser Ser Thr Tyr Phe
545 550

<210> 6
<211> 557
<212> PRT
<213> Homo sapiens

<400> 6

Met Arg Asp Tyr Asp Glu Val Thr Ala Phe Leu Gly Glu Trp Gly Pro
1 5 10 15

Phe Gln Arg Leu Ile Phe Phe Leu Leu Ser Ala Ser Ile Ile Pro Asn
20 25 30

Gly Phe Thr Gly Leu Ser Ser Val Phe Leu Ile Ala Thr Pro Glu His
35 40 45

Arg Cys Arg Val Pro Asp Ala Ala Asn Leu Ser Ser Ala Trp Arg Asn
50 55 60

His Thr Val Pro Leu Arg Leu Arg Asp Gly Arg Glu Val Pro His Ser
65 70 75 80

Cys Arg Arg Tyr Arg Leu Ala Thr Ile Ala Asn Phe Ser Ala Leu Gly
85 90 95

Leu Glu Pro Gly Arg Asp Val Asp Leu Gly Gln Leu Glu Gln Glu Ser
100 105 110

US Utility 50229-435 Sequence Listing.txt

Cys Leu Asp Gly Trp Glu Phe Ser Gln Asp Val Tyr Leu Ser Thr Ile
 115 120 125
 Val Thr Glu Trp Asn Leu Val Cys Glu Asp Asp Trp Lys Ala Pro Leu
 130 135 140
 Thr Ile Ser Leu Phe Phe Val Gly Val Leu Leu Gly Ser Phe Ile Ser
 145 150 155 160
 Gly Gln Leu Ser Asp Arg Phe Gly Arg Lys Asn Val Leu Phe Val Thr
 165 170 175
 Met Gly Met Gln Thr Gly Phe Ser Phe Leu Gln Ile Phe Ser Lys Asn
 180 185 190
 Phe Glu Met Phe Val Val Leu Phe Val Leu Val Gly Met Gly Gln Ile
 195 200 205
 Ser Asn Tyr Val Ala Ala Phe Val Leu Gly Thr Glu Ile Leu Gly Lys
 210 215 220
 Ser Val Arg Ile Ile Phe Ser Thr Leu Gly Val Cys Ile Phe Tyr Ala
 225 230 235 240
 Phe Gly Tyr Met Val Leu Pro Leu Phe Ala Tyr Phe Ile Arg Asp Trp
 245 250 255
 Arg Met Leu Leu Val Ala Leu Thr Met Pro Gly Val Leu Cys Val Ala
 260 265 270
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 Leu Trp Trp Phe Ile Pro Glu Ser Pro Arg Trp Leu Ile Ser Gln Gly
 275 280 285
 Arg Phe Glu Glu Ala Glu Val Ile Ile Arg Lys Ala Ala Lys Ala Asn
 290 295 300
 Gly Ile Val Val Pro Ser Thr Ile Phe Asp Pro Ser Glu Leu Gln Asp
 305 310 315 320
 Leu Ser Ser Lys Lys Gln Gln Ser His Asn Ile Leu Asp Leu Leu Arg
 325 330 335
 Thr Trp Asn Ile Arg Met Val Thr Ile Met Ser Ile Met Leu Trp Met
 340 345 350
 Thr Ile Ser Val Gly Tyr Phe Gly Leu Ser Leu Asp Thr Pro Asn Leu

US Utility 50229-435 Sequence Listing.txt

355

360

365

His Gly Asp Ile Phe Val Asn Cys Phe Leu Ser Ala Met Val Glu Val
370 375 380

Pro Ala Tyr Val Leu Ala Trp Leu Leu Leu Gln Tyr Leu Pro Arg Arg
385 390 395 400

Tyr Ser Met Ala Thr Ala Leu Phe Leu Gly Gly Ser Val Leu Leu Phe
405 410 415

Met Gln Leu Val Pro Pro Asp Leu Tyr Tyr Leu Ala Thr Val Leu Val
420 425 430

Met Val Gly Lys Phe Gly Val Thr Ala Ala Phe Ser Met Val Tyr Val
435 440 445

Tyr Thr Ala Glu Leu Tyr Pro Thr Val Val Arg Asn Met Gly Val Gly
450 455 460

Val Ser Ser Thr Ala Ser Arg Leu Gly Ser Ile Leu Ser Pro Tyr Phe
465 470 475 480

Val Tyr Leu Gly Ala Tyr Asp Arg Phe Leu Pro Tyr Ile Leu Met Gly
485 490 495

Ser Leu Thr Ile Leu Thr Ala Ile Leu Thr Leu Phe Leu Pro Glu Ser
500 505 510

Phe Gly Thr Pro Leu Pro Asp Thr Ile Asp Gln Met Leu Arg Val Lys
515 520 525

Gly Met Lys His Arg Lys Thr Pro Ser His Thr Arg Met Leu Lys Asp
530 535 540

Gly Gln Glu Arg Pro Thr Ile Leu Lys Ser Thr Ala Phe
545 550 555

<210> 7
<211> 555
<212> PRT
<213> Homo sapiens

<400> 7

Met Pro Thr Thr Val Asp Asp Val Leu Glu His Gly Gly Glu Phe His
1 5 10 15

Phe Phe Gln Lys Gln Met Phe Phe Leu Leu Ala Leu Leu Ser Ala Thr
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US Utility 50229-435 Sequence Listing.txt

20

25

30

Phe Ala Pro Ile Tyr Val Gly Ile Val Phe Leu Gly Phe Thr Pro Asp
35 40 45

His Arg Cys Arg Ser Pro Gly Val Ala Glu Leu Ser Leu Arg Cys Gly
50 55 60

Trp Ser Pro Ala Glu Glu Leu Asn Tyr Thr Val Pro Gly Pro Gly Pro
65 70 75 80

Ala Gly Glu Ala Ser Pro Arg Gln Cys Arg Arg Tyr Glu Val Asp Trp
85 90 95

Asn Gln Ser Thr Phe Asp Cys Val Asp Pro Leu Ala Ser Leu Asp Thr
100 105 110

Asn Arg Ser Arg Leu Pro Leu Gly Pro Cys Arg Asp Gly Trp Val Tyr
115 120 125

Glu Thr Pro Gly Ser Ser Ile Val Thr Glu Phe Asn Leu Val Cys Ala
130 135 140

Asn Ser Trp Met Leu Asp Leu Phe Gln Ser Ser Val Asn Val Gly Phe
145 150 155 160

Phe Ile Gly Ser Met Ser Ile Gly Tyr Ile Ala Asp Arg Phe Gly Arg
165 170 175

Lys Leu Cys Leu Leu Thr Thr Val Leu Ile Asn Ala Ala Ala Gly Val
180 185 190

Leu Met Ala Ile Ser Pro Thr Tyr Thr Trp Met Leu Ile Phe Arg Leu
195 200 205

Ile Gln Gly Leu Val Ser Lys Ala Gly Trp Leu Ile Gly Tyr Ile Leu
210 215 220

Ile Thr Glu Phe Val Gly Arg Arg Tyr Arg Arg Thr Val Gly Ile Phe
225 230 235 240

Tyr Gln Val Ala Tyr Thr Val Gly Leu Leu Val Leu Ala Gly Val Ala
245 250 255

Tyr Ala Leu Pro His Trp Arg Trp Leu Gln Phe Thr Val Ala Leu Pro
260 265 270

US Utility 50229-435 Sequence Listing.txt

Asn Phe Phe Phe Leu Leu Tyr Tyr Trp Cys Ile Pro Glu Ser Pro Arg
 275 280 285
 Trp Leu Ile Ser Gln Asn Lys Asn Ala Glu Ala Met Arg Ile Ile Lys
 290 295 300
 His Ile Ala Lys Lys Asn Gly Lys Ser Leu Pro Ala Ser Leu Gln Arg
 305 310 315 320
 Leu Arg Leu Glu Glu Glu Thr Gly Lys Lys Leu Asn Pro Ser Phe Leu
 325 330 335
 Asp Leu Val Arg Thr Pro Gln Ile Arg Lys His Thr Met Ile Leu Met
 340 345 350
 Tyr Asn Trp Phe Thr Ser Ser Val Leu Tyr Gln Gly Leu Ile Met His
 355 360 365
 Met Gly Leu Ala Gly Asp Asn Ile Tyr Leu Asp Phe Phe Tyr Ser Ala
 370 375 380
 Leu Val Glu Phe Pro Ala Ala Phe Met Ile Ile Leu Thr Ile Asp Arg
 385 390 395 400
 Ile Gly Arg Arg Tyr Pro Trp Ala Ala Ser Asn Met Val Ala Gly Ala
 405 410 415
 Ala Cys Leu Ala Ser Val Phe Ile Pro Gly Asp Leu Gln Trp Leu Lys
 420 425 430
 Ile Ile Ile Ser Cys Leu Gly Arg Met Gly Ile Thr Met Ala Tyr Glu
 435 440 445
 Ile Val Cys Leu Val Asn Ala Glu Leu Tyr Pro Thr Phe Ile Arg Asn
 450 455 460
 Leu Gly Val His Ile Cys Ser Ser Met Cys Asp Ile Gly Gly Ile Ile
 465 470 475 480
 Thr Pro Phe Leu Val Tyr Arg Leu Thr Asn Ile Trp Leu Glu Leu Pro
 485 490 495
 Leu Met Val Phe Gly Val Leu Gly Leu Val Ala Gly Gly Leu Val Leu
 500 505 510
 Leu Leu Pro Glu Thr Lys Gly Lys Ala Leu Pro Glu Thr Ile Glu Glu
 515 520 525

US Utility 50229-435 Sequence Listing.txt

Ala Glu Asn Met Gln Arg Pro Arg Lys Asn Lys Glu Lys Met Ile Tyr
530 535 540

Leu Gln Val Gln Lys Leu Asp Ile Pro Leu Asn
545 550 555

<210> 8
<211> 554
<212> PRT
<213> Homo sapiens

<400> 8

Met Pro Thr Val Asp Asp Ile Leu Glu Gln Val Gly Glu Ser Gly Trp
1 5 10 15

Phe Gln Lys Gln Ala Phe Leu Ile Leu Cys Leu Leu Ser Ala Ala Phe
20 25 30

Ala Pro Ile Cys Val Gly Ile Val Phe Leu Gly Phe Thr Pro Asp His
35 40 45

His Cys Gln Ser Pro Gly Val Ala Glu Leu Ser Gln Arg Cys Gly Trp
50 55 60

Ser Pro Ala Glu Glu Leu Asn Tyr Thr Val Pro Gly Leu Gly Pro Ala
65 70 75 80

Gly Glu Ala Phe Leu Gly Gln Cys Arg Arg Tyr Glu Val Asp Trp Asn
85 90 95

Gln Ser Ala Leu Ser Cys Val Asp Pro Leu Ala Ser Leu Ala Thr Asn
100 105 110

Arg Ser His Leu Pro Leu Gly Pro Cys Gln Asp Gly Trp Val Tyr Asp
115 120 125

Thr Pro Gly Ser Ser Ile Val Thr Glu Phe Asn Leu Val Cys Ala Asp
130 135 140

Ser Trp Lys Leu Asp Leu Phe Gln Ser Cys Leu Asn Ala Gly Phe Leu
145 150 155 160

Phe Gly Ser Leu Gly Val Gly Tyr Phe Ala Asp Arg Phe Gly Arg Lys
165 170 175

Leu Cys Leu Leu Gly Thr Val Leu Val Asn Ala Val Ser Gly Val Leu
180 185 190

US Utility 50229-435 Sequence Listing.txt

Met Ala Phe Ser Pro Asn Tyr Met Ser Met Leu Leu Phe Arg Leu Leu
195 200 205

Gln Gly Leu Val Ser Lys Gly Asn Trp Met Ala Gly Tyr Thr Leu Ile
210 215 220

Thr Glu Phe Val Gly Ser Gly Ser Arg Arg Thr Val Ala Ile Met Tyr
225 230 235 240

Gln Met Ala Phe Thr Val Gly Leu Val Ala Leu Thr Gly Leu Ala Tyr
245 250 255

Ala Leu Pro His Trp Arg Trp Leu Gln Leu Ala Val Ser Leu Pro Thr
260 265 270

Phe Leu Phe Leu Leu Tyr Tyr Trp Cys Val Pro Glu Ser Pro Arg Trp
275 280 285

Leu Leu Ser Gln Lys Arg Asn Thr Glu Ala Ile Lys Ile Met Asp His
290 295 300

Ile Ala Gln Lys Asn Gly Lys Leu Pro Pro Ala Asp Leu Lys Met Leu
305 310 315 320

Ser Leu Glu Glu Asp Val Thr Glu Lys Leu Ser Pro Ser Phe Ala Asp
325 330 335

Leu Phe Arg Thr Pro Arg Leu Arg Lys Arg Thr Phe Ile Leu Met Tyr
340 345 350

Leu Trp Phe Thr Asp Ser Val Leu Tyr Gln Gly Leu Ile Leu His Met
355 360 365

Gly Ala Thr Ser Gly Asn Leu Tyr Leu Asp Phe Leu Tyr Ser Ala Leu
370 375 380

Val Glu Ile Pro Gly Ala Phe Ile Ala Leu Ile Thr Ile Asp Arg Val
385 390 395 400

Gly Arg Ile Tyr Pro Met Ala Met Ser Asn Leu Leu Ala Gly Ala Ala
405 410 415

Cys Leu Val Met Ile Phe Ile Ser Pro Asp Leu His Trp Leu Asn Ile
420 425 430

Ile Ile Met Cys Val Gly Arg Met Gly Ile Thr Ile Ala Ile Gln Met
435 440 445

US Utility 50229-435 Sequence Listing.txt

Ile Cys Leu Val Asn Ala Glu Leu Tyr Pro Thr Phe Val Arg Asn Leu
450 455 460

Gly Val Met Val Cys Ser Ser Leu Cys Asp Ile Gly Gly Ile Ile Thr
465 470 475 480

Pro Phe Ile Val Phe Arg Leu Arg Glu Val Trp Gln Ala Leu Pro Leu
485 490 495

Ile Leu Phe Ala Val Leu Gly Leu Leu Ala Ala Gly Val Thr Leu Leu
500 505 510

Leu Pro Glu Thr Lys Gly Val Ala Leu Pro Glu Thr Met Lys Asp Ala
515 520 525

Glu Asn Leu Gly Arg Lys Ala Lys Pro Lys Glu Asn Thr Ile Tyr Leu
530 535 540

Lys Val Gln Thr Ser Glu Pro Ser Gly Thr
545 550

<210> 9
<211> 539
<212> PRT
<213> Homo sapiens
<400> 9

Met Ala Phe Glu Glu Leu Leu Ser Gln Val Gly Gly Leu Gly Arg Phe
1 5 10 15

Gln Met Leu His Leu Val Phe Ile Leu Pro Ser Leu Met Leu Leu Ile
20 25 30

Pro His Ile Leu Leu Glu Asn Phe Ala Ala Ala Ile Pro Gly His Arg
35 40 45

Cys Trp Val His Met Leu Asp Asn Asn Thr Gly Ser Gly Asn Glu Thr
50 55 60

Gly Ile Leu Ser Glu Asp Ala Leu Leu Arg Ile Ser Ile Pro Leu Asp
65 70 75 80

Ser Asn Leu Arg Pro Glu Lys Cys Arg Phe Phe Val His Pro Gln Trp
85 90 95

Gln Leu Leu His Leu Asn Gly Ile His Ser Thr Ser Glu Ala Asp Thr
100 105 110

US Utility 50229-435 Sequence Listing.txt

Glu Pro Cys Val Asp Gly Trp Val Tyr Asp Gln Ser Tyr Phe Pro Ser
115 120 125

Thr Ile Val Thr Lys Trp Asp Leu Val Cys Asp Tyr Gln Ser Leu Lys
130 135 140

Ser Val Val Gln Phe Leu Leu Leu Thr Gly Met Leu Val Gly Gly Ile
145 150 155 160

Ile His His Gly Val Ser Asp Arg Phe Gly Arg Arg Phe Ile Leu Arg
165 170 175

Trp Cys Leu Leu Gln Leu Ala Ile Thr Asp Thr Cys Ala Ala Phe Ala
180 185 190

Pro Thr Phe Pro Val Tyr Cys Val Leu Arg Phe Leu Ala Gly Phe Ser
195 200 205

Ser Met Ile Ile Ile Ser Asn Asn Ser Leu Pro Ile Thr Glu Trp Ile
210 215 220

Arg Pro Asn Ser Lys Ala Leu Val Val Ile Leu Ser Ser Gly Ala Leu
225 230 235 240

Ser Ile Gly Gln Ile Ile Leu Gly Gly Leu Ala Tyr Val Phe Arg Asp
245 250 255

Trp Gln Thr Leu His Val Val Ala Ser Val Pro Phe Leu Gly Leu Leu
260 265 270

Leu Leu Gln Arg Trp Leu Val Glu Ser Ala Arg Trp Leu Ile Ile Thr
275 280 285

Asn Lys Leu Asp Glu Gly Leu Lys Ala Leu Arg Lys Val Ala Arg Thr
290 295 300

Asn Gly Ile Lys Asn Ala Glu Glu Thr Leu Asn Ile Glu Val Val Arg
305 310 315 320

Ser Thr Met Gln Glu Glu Leu Asp Ala Ala Gln Thr Lys Thr Thr Val
325 330 335

Cys Asp Leu Phe Arg Asn Pro Ser Met Arg Lys Arg Ile Cys Ile Leu
340 345 350

Val Phe Leu Arg Phe Ala Asn Thr Ile Pro Phe Tyr Gly Thr Met Val

US utility 50229-435 Sequence Listing.txt

355

360

365

Asn Leu Gln His Val Gly Ser Asn Ile Phe Leu Leu Gln Val Leu Tyr
370 375 380

Gly Ala Val Ala Leu Ile Val Arg Cys Leu Ala Leu Leu Thr Leu Asn
385 390 395 400

His Met Gly Arg Arg Ile Ser Gln Ile Leu Phe Met Phe Leu Val Gly
405 410 415

Leu Ser Ile Leu Ala Asn Thr Phe Val Pro Lys Glu Met Gln Thr Leu
420 425 430

Arg Val Ala Leu Ala Cys Leu Gly Ile Gly Cys Ser Ala Ala Thr Phe
435 440 445

Ser Ser Val Ala Val His Phe Ile Glu Leu Ile Pro Thr Val Leu Arg
450 455 460

Ala Arg Ala Ser Gly Ile Asp Leu Thr Ala Ser Arg Ile Gly Ala Ala
465 470 475 480

Leu Pro Leu Leu Met Thr Leu Thr Val Phe Phe Thr Thr Leu Pro Trp
485 490 495

Ile Ile Tyr Gly Ile Phe Pro Ile Ile Gly Gly Leu Ile Val Phe Leu
500 505 510

Leu Pro Glu Thr Lys Asn Leu Pro Leu Pro Asp Thr Ile Lys Asp Val
515 520 525

Glu Asn Gln Lys Lys Asn Leu Lys Glu Lys Ala
530 535

<210> 10
<211> 550
<212> PRT
<213> Homo sapiens

<400> 10

Met Ala Phe Ser Lys Leu Leu Glu Gln Ala Gly Gly Val Gly Leu Phe
1 5 10 15

Gln Thr Leu Gln Val Leu Thr Phe Ile Leu Pro Cys Leu Met Ile Pro
20 25 30

Ser Gln Met Leu Leu Glu Asn Phe Ser Ala Ala Ile Pro Gly His Arg
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35

40

45

Cys Trp Thr His Met Leu Asp Asn Gly Ser Ala Val Ser Thr Asn Met
 50 55 60

Thr Pro Lys Ala Leu Leu Thr Ile Ser Ile Pro Pro Gly Pro Asn Gln
 65 70 75 80

Gly Pro His Gln Cys Arg Arg Phe Arg Gln Pro Gln Trp Gln Leu Leu
 85 90 95

Asp Pro Asn Ala Thr Ala Thr Ser Trp Ser Glu Ala Asp Thr Glu Pro
 100 105 110

Cys Val Asp Gly Trp Val Tyr Asp Arg Ser Val Phe Thr Ser Thr Ile
 115 120 125

Val Ala Lys Trp Asp Leu Val Cys Ser Ser Gln Gly Leu Lys Pro Leu
 130 135 140

Ser Gln Ser Ile Phe Met Ser Gly Ile Leu Val Gly Ser Phe Ile Trp
 145 150 155 160

Gly Leu Leu Ser Tyr Arg Phe Gly Arg Lys Pro Met Leu Ser Trp Cys
 165 170 175

Cys Leu Gln Leu Ala Val Ala Gly Thr Ser Thr Ile Phe Ala Pro Thr
 180 185 190

Phe Val Ile Tyr Cys Gly Leu Arg Phe Val Ala Ala Phe Gly Met Ala
 195 200 205

Gly Ile Phe Leu Ser Ser Leu Thr Leu Met Val Glu Trp Thr Thr Thr
 210 215 220

Ser Arg Arg Ala Val Thr Met Thr Val Val Gly Cys Ala Phe Ser Ala
 225 230 235 240

Gly Gln Ala Ala Leu Gly Gly Leu Ala Phe Ala Leu Arg Asp Trp Arg
 245 250 255

Thr Leu Gln Leu Ala Ala Ser Val Pro Phe Phe Ala Ile Ser Leu Ile
 260 265 270

Ser Trp Trp Leu Pro Glu Ser Ala Arg Trp Leu Ile Ile Lys Gly Lys
 275 280 285

US Utility 50229-435 Sequence Listing.txt

Pro Asp Gln Ala Leu Gln Glu Leu Arg Lys Val Ala Arg Ile Asn Gly
 290 295 300

His Lys Glu Ala Lys Asn Leu Thr Ile Glu Val Leu Met Ser Ser Val
 305 310 315 320

Lys Glu Glu Val Ala Ser Ala Lys Glu Pro Arg Ser Val Leu Asp Leu
 325 330 335

Phe Cys Val Pro Val Leu Arg Trp Arg Ser Cys Ala Met Leu Val Val
 340 345 350

Asn Phe Ser Leu Leu Ile Ser Tyr Tyr Gly Leu Val Phe Asp Leu Gln
 355 360 365

Ser Leu Gly Arg Asp Ile Phe Leu Leu Gln Ala Leu Phe Gly Ala Val
 370 375 380

Asp Phe Leu Gly Arg Ala Thr Thr Ala Leu Leu Leu Ser Phe Leu Gly
 385 390 395 400

Arg Arg Thr Ile Gln Ala Gly Ser Gln Ala Met Ala Gly Leu Ala Ile
 405 410 415

Leu Ala Asn Met Leu Val Pro Gln Asp Leu Gln Thr Leu Arg Val Val
 420 425 430

Phe Ala Val Leu Gly Lys Gly Cys Phe Gly Ile Ser Leu Thr Cys Leu
 435 440 445

Thr Ile Tyr Lys Ala Glu Leu Phe Pro Thr Pro Val Arg Met Thr Ala
 450 455 460

Asp Gly Ile Leu His Thr Val Gly Arg Leu Gly Ala Met Met Gly Pro
 465 470 475 480

Leu Ile Leu Met Ser Arg Gln Ala Leu Pro Leu Leu Pro Pro Leu Leu
 485 490 495

Tyr Gly Val Ile Ser Ile Ala Ser Ser Leu Val Val Leu Phe Phe Leu
 500 505 510

Pro Glu Thr Gln Gly Leu Pro Leu Pro Asp Thr Ile Gln Asp Leu Glu
 515 520 525

Ser Gln Lys Ser Thr Ala Ala Gln Gly Asn Arg Gln Glu Ala Val Thr
 530 535 540

US Utility 50229-435 Sequence Listing.txt

Val Glu Ser Thr Ser Leu
545 550

<210> 11
<211> 542
<212> PRT
<213> Homo sapiens

<400> 11

Met Thr Phe Ser Glu Ile Leu Asp Arg Val Gly Ser Met Gly His Phe
1 5 10 15

Gln Phe Leu His Val Ala Ile Leu Gly Leu Pro Ile Leu Asn Met Ala
20 25 30

Asn His Asn Leu Leu Gln Ile Phe Thr Ala Ala Thr Pro Val His His
35 40 45

Cys Arg Pro Pro His Asn Ala Ser Thr Gly Pro Trp Val Leu Pro Met
50 55 60

Gly Pro Asn Gly Lys Pro Glu Arg Cys Leu Arg Phe Val His Pro Pro
65 70 75 80

Asn Ala Ser Leu Pro Asn Asp Thr Gln Arg Ala Met Glu Pro Cys Leu
85 90 95

Asp Gly Trp Val Tyr Asn Ser Thr Lys Asp Ser Ile Val Thr Glu Trp
100 105 110

Asp Leu Val Cys Asn Ser Asn Lys Leu Lys Glu Met Ala Gln Ser Ile
115 120 125

Phe Met Ala Gly Ile Leu Ile Gly Gly Leu Val Leu Gly Asp Leu Ser
130 135 140

Asp Arg Phe Gly Arg Arg Pro Ile Leu Thr Cys Ser Tyr Leu Leu Leu
145 150 155 160

Ala Ala Ser Gly Ser Gly Ala Ala Phe Ser Pro Thr Phe Pro Ile Tyr
165 170 175

Met Val Phe Arg Phe Leu Cys Gly Phe Gly Ile Ser Gly Ile Thr Leu
180 185 190

Ser Thr Val Ile Leu Asn Val Glu Trp Val Pro Thr Arg Met Arg Ala
195 200 205

US Utility 50229-435 Sequence Listing.txt

Ile Met Ser Thr Ala Leu Gly Tyr Cys Tyr Thr Phe Gly Gln Phe Ile
210 215 220

Leu Pro Gly Leu Ala Tyr Ala Ile Pro Gln Trp Arg Trp Leu Gln Leu
225 230 235 240

Thr Val Ser Ile Pro Phe Phe Val Phe Phe Leu Ser Ser Trp Trp Thr
245 250 255

Pro Glu Ser Ile Arg Trp Leu Val Leu Ser Gly Lys Ser Ser Glu Ala
260 265 270

Leu Lys Ile Leu Arg Arg Val Ala Val Phe Asn Gly Lys Lys Glu Glu
275 280 285

Gly Glu Arg Leu Ser Leu Glu Glu Leu Lys Leu Asn Leu Gln Lys Glu
290 295 300

Ile Ser Leu Ala Lys Ala Lys Tyr Thr Ala Ser Asp Leu Phe Arg Ile
305 310 315 320

Pro Met Leu Arg Arg Met Thr Phe Cys Leu Ser Leu Ala Trp Phe Ala
325 330 335

Thr Gly Phe Ala Tyr Tyr Ser Leu Ala Met Gly Val Glu Glu Phe Gly
340 345 350

Val Asn Leu Tyr Ile Leu Gln Ile Ile Phe Gly Gly Val Asp Val Pro
355 360 365

Ala Lys Phe Ile Thr Ile Leu Ser Leu Ser Tyr Leu Gly Arg His Thr
370 375 380

Thr Gln Ala Ala Ala Leu Leu Leu Ala Gly Gly Ala Ile Leu Ala Leu
385 390 395 400

Thr Phe Val Pro Leu Asp Leu Gln Thr Val Arg Thr Val Leu Ala Val
405 410 415

Phe Gly Lys Gly Cys Leu Ser Ser Ser Phe Ser Cys Leu Phe Leu Tyr
420 425 430

Thr Ser Glu Leu Tyr Pro Thr Val Ile Arg Gln Thr Gly Met Gly Val
435 440 445

Ser Asn Leu Trp Thr Arg Val Gly Ser Met Val Ser Pro Leu Val Lys
450 455 460

US utility 50229-435 Sequence Listing.txt

Ile Thr Gly Glu Val Gln Pro Phe Ile Pro Asn Ile Ile Tyr Gly Ile
465 470 475 480

Thr Ala Leu Leu Gly Gly Ser Ala Ala Leu Phe Leu Pro Glu Thr Leu
485 490 495

Asn Gln Pro Leu Pro Glu Thr Ile Glu Asp Leu Glu Asn Trp Ser Leu
500 505 510

Arg Ala Lys Lys Pro Lys Gln Glu Pro Glu Val Glu Lys Ala Ser Gln
515 520 525

Arg Ile Pro Leu Gln Pro His Gly Pro Gly Leu Gly Ser Ser
530 535 540

<210> 12
<211> 550
<212> PRT
<213> Homo sapiens
<400> 12

Met Ala Phe Asn Asp Leu Leu Gln Gln Val Gly Gly Val Gly Arg Phe
1 5 10 15

Gln Gln Ile Gln Val Thr Leu Val Val Leu Pro Leu Leu Leu Met Ala
20 25 30

Ser His Asn Thr Leu Gln Asn Phe Thr Ala Ala Ile Pro Thr His His
35 40 45

Cys Arg Pro Pro Ala Asp Ala Asn Leu Ser Lys Asn Gly Gly Leu Glu
50 55 60

Val Trp Leu Pro Arg Asp Arg Gln Gly Gln Pro Glu Ser Cys Leu Arg
65 70 75 80

Phe Thr Ser Pro Gln Trp Gly Leu Pro Phe Leu Asn Gly Thr Glu Ala
85 90 95

Asn Gly Thr Gly Ala Thr Glu Pro Cys Thr Asp Gly Trp Ile Tyr Asp
100 105 110

Asn Ser Thr Phe Pro Ser Thr Ile Val Thr Glu Trp Asp Leu Val Cys
115 120 125

Ser His Arg Ala Leu Arg Gln Leu Ala Gln Ser Leu Tyr Met Val Gly
130 135 140

US utility 50229-435 Sequence Listing.txt

Val Leu Leu Gly Ala Met Val Phe Gly Tyr Leu Ala Asp Arg Leu Gly
145 150 155 160

Arg Arg Lys Val Leu Ile Leu Asn Tyr Leu Gln Thr Ala Val Ser Gly
165 170 175

Thr Cys Ala Ala Phe Ala Pro Asn Phe Pro Ile Tyr Cys Ala Phe Arg
180 185 190

Leu Leu Ser Gly Met Ala Leu Ala Gly Ile Ser Leu Asn Cys Met Thr
195 200 205

Leu Asn Val Glu Trp Met Pro Ile His Thr Arg Ala Cys Val Gly Thr
210 215 220

Leu Ile Gly Tyr Val Tyr Ser Leu Gly Gln Phe Leu Leu Ala Gly Val
225 230 235 240

Ala Tyr Ala Val Pro His Trp Arg His Leu Gln Leu Leu Val Ser Ala
245 250 255

Pro Phe Phe Ala Phe Phe Ile Tyr Ser Trp Phe Phe Ile Glu Ser Ala
260 265 270

Arg Trp His Ser Ser Ser Gly Arg Leu Asp Leu Thr Leu Arg Ala Leu
275 280 285

Gln Arg Val Ala Arg Ile Asn Gly Lys Arg Glu Glu Gly Ala Lys Leu
290 295 300

;
Ser Met Glu Val Leu Arg Ala Ser Leu Gln Lys Glu Leu Thr Met Gly
305 310 315 320

Lys Gly Gln Ala Ser Ala Met Glu Leu Leu Arg Cys Pro Thr Leu Arg
325 330 335

His Leu Phe Leu Cys Leu Ser Met Leu Trp Phe Ala Thr Ser Phe Ala
340 345 350

Tyr Tyr Gly Leu Val Met Asp Leu Gln Gly Phe Gly Val Ser Ile Tyr
355 360 365

Leu Ile Gln Val Ile Phe Gly Ala Val Asp Leu Pro Ala Lys Leu Val
370 375 380

US Utility 50229-435 Sequence Listing.txt
 385 390 395 400

Ala Leu Leu Leu Ala Gly Ile Cys Ile Leu Leu Asn Gly Val Ile Pro
 405 410 415

Gln Asp Gln Ser Ile Val Arg Thr Ser Leu Ala Val Leu Gly Lys Gly
 420 425 430

Cys Leu Ala Ala Ser Phe Asn Cys Ile Phe Leu Tyr Thr Gly Glu Leu
 435 440 445

Tyr Pro Thr Met Ile Arg Gln Thr Gly Met Gly Met Gly Ser Thr Met
 450 455 460

Ala Arg Val Gly Ser Ile Val Ser Pro Leu Val Ser Met Thr Ala Glu
 465 470 475 480

Leu Tyr Pro Ser Met Pro Leu Phe Ile Tyr Gly Ala Val Pro Val Ala
 485 490 495

Ala Ser Ala Val Thr Val Leu Leu Pro Glu Thr Leu Gly Gln Pro Leu
 500 505 510

Pro Asp Thr Val Gln Asp Leu Glu Ser Arg Lys Gly Lys Gln Thr Arg
 515 520 525

Gln Gln Gln Glu His Gln Lys Tyr Met Val Pro Leu Gln Ala Ser Ala
 530 535 540

Gln Glu Lys Asn Gly Leu
 545 550

<210> 13
 <211> 24
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Chemically synthesized

<400> 13
 ggcacattta ttcaccaaga ccag

24

<210> 14
 <211> 24
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Chemically synthesized

US Utility 50229-435 Sequence Listing.txt

<400> 14

tgtggacctc agcagcattt ggat

24